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Pyrochemical Processing of ICPP HLW Calcine*

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ABSTRACT

A pyrochemical processing method is a possible means of separating high-level waste (HLW) calcine from the Idaho Chemical Processing Plant (ICPP) into low-level waste (LLW) and HLW. The central elements of such a process are a fluorine removal step, a carbochlorination step, and a reduction step. Various other steps in the process would be added to convert output materials into desirable forms or to allow processing materials to be recycled. Recent experimental work to remove fluorine from a simulated ICPP calcine using a calcium chloride wash, a calcium reduction, or a sulfuric acid treatment will be discussed. The calcium chloride wash and sulfuric acid treatments were found to be the most effective for fluorine removal. In each approach, greater than 97% of the fluorine could be removed whereas only 50 to 80% of the fluorine could be removed by calcium reduction. Experiments to regenerate calcium chloride for reuse after the calcium chloride wash experiments and proposed process flowsheets which incorporate the various fluorine removal methods will also be discussed.

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